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EPA Superfund
Record of Decision:

MCCOLL
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VOLUME 1

RECORD OF DECISION
FOR THE
MCCOLL SUPERFUND SITE

SOURCE OPERABLE UNIT

FULLERTON, CALIFORNIA

June 1993

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION IX
75 HAWTHORNE STREET
SAN FRANCISCO, CALIFORNIA 94105

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Fullerton, California

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LIST OF ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
BPHE	Baseline Public Health Evaluation
CDI	Chronic Daily Intake
CED	Campaign for Economic Democracy
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
DOI	U.S. Department of Interior
DTSC	California Department of Toxic Substances Control
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
HI	Hazard Index
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OU	Operable Units
PHERA	Public Health Evaluation of Remedial Alternatives
PRP	Potentially Responsible Party
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
RfD	Reference Dose
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SROA	Supplemental Reevaluation of Alternatives
TBC	To Be Considered

PART I. DECLARATION

1.0 SITE NAME AND LOCATION

McColl Superfund Site
2650 Rosecrans Avenue
Fullerton, California 92633

2.0 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the selected remedial action for the McColl Superfund site in Fullerton, California. The ROD is presented in two volumes. Volume one contains the Declaration, the Decision Summary, and appendices. Volume two contains the Responsiveness Summary and appendices.

This document was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. Section 9601 et seq., and, to the extent practicable, in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Section 300 et seq., ("NCP"). The administrative record index identifies the documents upon which the selection of the remedial action is based.

3.0 ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

4.0 DESCRIPTION OF THE SELECTED REMEDY

This ROD selects a remedy for the source soils operable unit, addressing the waste and the contaminated surrounding soils. Groundwater issues will be addressed in a later operable unit ROD.

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives using the nine criteria, and public comments, EPA, after consultation with the California Department of Toxic Substances Control (DTSC), has determined that Soft Material Solidification is the most appropriate remedy for the McColl Superfund Site. Due to technical uncertainties that cannot be resolved until field implementation, EPA has included a contingency to the selected remedy. Therefore, EPA believes that Soft Material Solidification with a contingency of RCRA-equivalent closure is the most appropriate remedy. This remedy will treat the principal threats at the Site such as benzene, sulfur dioxide, and arsenic. It will minimize the seeping material and will treat the acidic soft material by eliminating its corrosive characteristic.

4.1 Components of the Selected Remedy

The selected remedy will involve solidification of all soft material in each sump above the char/soft material interface. The remedy consists of the following components:

- Excavation and decontamination of shallow metallic sprinkler pipes in the Los Coyotes area, followed by off-site transportation and disposal.

- Characterization of each sump using field methods such as cone penetrometers, correlated with subsurface borings, to determine the top of the char layer in each sump.

- Installation of subsurface slurry cut-off walls around the Upper Ramparts sumps, and a separate slurry cut-off wall around the Lower Ramparts and the Los Coyotes sumps (see Figure 6, Part II).

- Slope stability improvements are to be determined during design in unstable slope areas (see Figure 7, Part II).

- In-situ solidification of the soil, drilling mud, tar wastes, and contaminated soils above the char layer. The proposed plan presented a conceptual approach of using two 5-foot diameter augers for the solidification. However, the final decision on the equipment size will be determined during design.

- The site will be graded (to contour the site, and to allow movement of waste away from homes) and a RCRA cover system, including a permanent gas collection and treatment system, will be placed over the solidified sumps.

- Long-term operation and maintenance includes installation of groundwater and vadose monitoring wells, monitoring of the groundwater, and a gas collection system.

- Site security and routine site maintenance.

In selecting Soft Material Solidification, EPA intends to treat by solidification all of the material in each sump above the char/soft material interface.

The project implementation cost for this alternative is $46,073,000 (1990 dollars). The annual operation and maintenance costs are $828,000. The net present value (1994 dollars) for capital cost and operation and maintenance cost for the 30 year design in $78,620,000. Implementation of this remedy is expected to take approximately 4.7 years, of which approximately 2.8 years is utilized for actual in-situ solidification activities.

4.2 Contingent Remedy

Soft Material Solidification will be applied first to one sump. If EPA determines that Soft Material Solidification is technically implementable, it will be implemented on the remaining 11 sumps. In deciding whether Soft Material Solidification is technically implementable, EPA will consider at a minimum eight performance criteria.

At the conclusion of the one sump test, EPA will consider whether the results of the one sump test, when extrapolated to site-wide implementation, deviate excessively, both individually and collectively, from the expected results set forth in these eight criteria. EPA will evaluate the extent of deviation from these criteria and determine if Soft Material Solidification continues to be the most appropriate remedy for the site.

Although EPA is confident that Soft Material Solidification will be successful at the McColl site, there is inherent uncertainty whenever a remedy involves the implementation of a proven treatment technology in an innovative manner. Therefore, EPA has decided to include RCRA-equivalent closure as a contingent remedy in the event EPA determines that Soft Material Solidification is not technically implementable as discussed above.

If RCRA-equivalent closure is chosen it would consist of the following: constructing a multilayer cap over the untreated sumps with a gas collection and treatment system to prevent infiltration of water and release of hazardous air emissions; building subsurface slurry walls around the sumps to prevent migration of water into the waste and outward migration of contaminants; stabilizing steep slopes on the site with retaining walls; and conducting groundwater monitoring. Operation and maintenance will be necessary in perpetuity at the site, which include site security and routine site maintenance.

The project implementation cost for the contingency remedy is $14,737,000 (1990 dollars). The annual operation and maintenance costs are estimated at $828,000. The net present value (1994 dollars) for capital cost and operation and maintenance cost for 30 year design is $36,722,000. Implementation of this remedy is expected to take approximately 2.2 years, of which approximately 1.3 years is utilized for actual field activities.

5.0 STATUTORY DETERMINATIONS

The selected remedy, including the contingent remedy, is protective of human health and the environment, complies with Federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principle element. Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

PART II. DECISION SUMMARY

1.0 SITE NAME, LOCATION AND DESCRIPTION

The McColl Superfund site is a former refinery waste disposal site located in the City of Fullerton, Orange County, California (see Figure 1). The site surface and former site development features divide the site into three general areas. The Ramparts area is a terraced section, sloping toward the south, located in the northeast portion of the site. The Los Coyotes area is southwest of the Ramparts area in the southeast section of the site. The Ramparts and Los Coyotes areas contain waste disposal pits called sumps. These areas are now covered with sparse grasses and other low-growing vegetation. The third area, a staging and parking area located at the northwestern section of the site, was developed in 1983 in anticipation of waste excavation remediation activities. These areas are presented in Figure 2.

2.0 SITE HISTORY

From 1942 through 1946, approximately 72,600 cubic yards of waste sludge was disposed of into the 12 Ramparts and Los Coyotes sumps at the McColl site. The Ramparts area contains six sumps, referred to as sumps R-1 through R-6. The Los Coyotes area also contains six sumps, referred to as sumps L-1 through L-6. In an attempt to mitigate site odors during the 1950s and early 1960s, three sumps (R-1, R-2, and R-4) in the Ramparts area were covered with drilling mud. Arsenic-containing waste of an unknown date and origin was later disposed of into Ramparts sump R-1. Additional soil cover was placed over the sumps in the Ramparts area in September 1983. The Los Coyotes sumps were covered with natural fill materials during the construction of the Los Coyotes Country Club golf course in the late 1950s. As a result, all of the sumps at McColl are now covered by one to five feet of overburden.

Previous remedial investigations completed by DTSC and EPA provided characterization of the types and location of wastes at the McColl site. In general, the four types of material (char, tar, drilling mud, and soil) are contained within the sumps and occur as distinct types of waste that are somewhat segregated by depth, although not as discrete strata. The largest waste fraction consists of a char waste material that occurs mainly in the bottom layer of all sumps. The char has been described as a coal like material in various drilling logs. The upper portion of the sumps is comprised of soil or a combination of soil and drilling mud. The tar is believed to be dispersed as pockets within the soil cover, drilling mud and char material. However, the exact location and disposition of tar within the sumps is unknown. Because the tar is soft and mobile, it appears at approximately 50 surface locations at the site as seeps (see Figure 3).

3.0 ENFORCEMENT HISTORY

EPA has identified several potentially responsible parties (PRPs) for the McColl site. As discussed below, EPA is currently in litigation with four national oil company PRPs (Shell Oil Company; Union Oil Company of California; Atlantic Richfield Company; and Texaco, Inc.) and a site landowner PRP, McAuley LCX Corporation. EPA has interacted with other PRPs from time to time, including Phillips Petroleum. Several PRPs have been involved in the McCollsite since the early 1980s, when they participated in site investigatory work. Over the last several years, the four oil companies plus Phillips Petroleum have referred to themselves collectively as the McColl Site Group.

Enforcement activities began in 1983 when EPA sent general notice letters to a group of PRPs including several oil companies. In July 1984, after EPA issued a ROD selecting an excavation and redisposal remedy, EPA issued orders to several PRPs pursuant to CERCLA Section 106 directing implementation of the remedy. The respondents named in the orders refused to comply and sued EPA in federal district court. In early 1990, EPA issued special notice letters to the five oil companies and the landowner McAuley, followed by Section 106 orders, relating to groundwater investigatory work. These parties again refused to comply with the orders.

In February 1991, the United States and the State of California filed suit in a federal district court against Shell Oil Company, Union Oil Company of California; Atlantic Richfield Company; Texaco, Inc.; and McAuley LCX Corporation pursuant to Section 107 of CERCLA. The governments are seeking to recover all costs already incurred in connection with the site and are seeking a declaration that the defendants are liable for the cleanup. The court has ruled that the landowner McAuley LCX Corporation is liable under CERCLA for costs and for cleanup. EPA is seeking a similar early ruling against the oil company defendants based on clear evidence that they arranged for the disposal of the waste at the site.

4.0 PAST INVESTIGATIONS AND CLEANUP PROPOSALS

In 1984, EPA signed a ROD selecting excavation and off-site disposal of the wastes at the McColl site. In 1985, a California State Superior Court enjoined the predecessor of DTSC from implementing the excavation remedy, finding the state had failed to comply with the California Environmental Quality Act (CEQA), without performing an Environmental Impact Report (EIR).

Congress amended the Superfund law in 1986, and EPA undertook a reevaluation of remedial alternatives. The reevaluation included extensive work on an excavation and thermal destruction alternative. In 1989 EPA issued an updated feasibility study (the SROA), and a Proposed Plan identifying thermal destruction as the preferred remedy. EPA provided a public comment period on the Proposed Plan. In 1989 and 1990, EPA also conducted off-site thermal destruction tests and an on-site excavation demonstration.

Based on the information from the treatability studies and the public comments received, EPA decided to re-evaluate the remedial alternatives. The result of this assessment was the SROA II. The SROA II re-evaluated RCRA equivalent closure, RCRA-equivalent containment, and thermal destruction from the 1989 SROA and evaluated several new alternatives involving full or partial solidification of waste materials, including a proposal by the McColl Site Group.

In August 1992, EPA issued a Proposed Plan expressing its preference for the Soft Material Solidification alternative with a contingency for RCRA-equivalent closure. A public comment period was held from August 31 to September 29, 1992 on the SROA II and EPA's Proposed Plan. The McColl Site Group requested and received an extension to the comment period until October 29, 1992. A public meeting was held on September 17, 1992 to answer questions and accept formal public comments.

5.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The remedy selection process has fulfilled the public participation requirements of CERCLA Sections 113 and 117. Community members have been involved with the McColl site since the beginning of the investigation. The site initially was brought to the attention of the regulatory agencies as a result of odor and health complaints received from residents beginning in July 1978. Community concern increased gradually through 1980. The efforts of the Campaign for Economic Democracy (CED), a statewide consumer and environmental organization, and a speech given to residents by Louis Gibbs, president of the Love Canal Homeowners Association, focused media attention on the site and heightened community awareness about McColl.

Due to the increasing community concerns, DTSC organized a public hearing in the fall of 1980. Peter Weiner, the Governor's special assistant on Toxic Substances Control, chaired the hearing. A panel of state agency representatives also participated. Jane Fonda, of CED, spoke to the community residents and the media following the hearing.

Individual members of the community continued to be involved in discussions and decisions related to the site through 1984, when EPA and DTSC announced that the site would be remediated using the excavation and redisposal alternative. Community comments received at the first public hearing indicated strong community support for this decision.

Following the state court injunction blocking the state from implementing the remedy, some community members expressed increasing frustration at delays in the clean-up process. This frustration led to the formation of the McColl Action Group. This neighborhood committee participated actively in decisions related to the site from 1985 through 1991. EPA and DTSC often were invited to make presentations to the group. The group disbanded in 1991.

Another community group was formed in 1991, the Fullerton Hills Community Association. This group has had input into site-related decisions since its formation.

Elected officials also have expressed interest in the site, most notably former Congressman William Dannemeyer. All elected officials in the area are on the mailing list for the site, and receive information related to site activities.

Starting in 1986, EPA and DTSC have held regular meetings as part of the Interagency Committee. The committee is comprised of the following agencies: U.S. Environmental Protection Agency, State of California Department of Toxic Substances Control, City of Fullerton, South Coast Air Quality Management District, City of Buena Park, Orange County Environmental Health, and California Regional Water Quality Control Board, California Department of Health Services' Drinking Water Branch, and California Environmental Protection Agency's Office of Environmental Health Hazard Assessment. The elected officials include the 39th Congressional District (formerly held by Representative Dannemeyer and currently held by Representative Edward Royce).

Community participation has continued to be important in the decision-making process over the last several years. During the public comment period and public hearing to receive comments on the proposed thermal destruction plan of February 1989, community members wrote more than 140 letters and made more than 100 oral comments.

Far fewer comments were received from the public during the 1992 comment period compared to the comment period on the proposed thermal destruction plan in 1989. The most recent public comments indicate that community opinion on the Proposed Plan varied widely. Some commenters supported EPA's proposed plan. Some residents continued supporting a total cleanup of McColl waste, and others supported the McColl Site Group's proposal for selective treatment of the waste. In general, residents are frustrated at a perceived lack of action at the site, and are in favor of moving forward with any plan they believe will minimize risk to the community, and can be implemented in a reasonable amount of time at a reasonable cost.

Throughout the remedial process, EPA and DTSC have continued to conduct a variety of community relations activities. Activities have included frequent public meetings, small group meetings, regular mailings to community members, a toll-free information line, an on-site open house, and regular contact with the media to provide information.

EPA has taken community concerns into account in its decision making for the remedy. In order to avoid future frustration caused by project delays, EPA has proposed a contingency of RCRA-equivalent closure if the selected remedy (Soft Material Solidification) is not technically implementable. The use of a contingency ROD will help avoid further delays in the cleanup process by eliminating the need to select another remedy if the selected remedy (Soft Material Solidification) cannot be fully implemented. EPA believes the selected remedy protects human health and the environment, will be completed in a reasonable amount of time with low risk to the community, and is cost effective.

EPA will continue to work closely with DTSC and the community throughout the entire remediation process to keep residents informed of progress at the site. EPA and DTSC will monitor community interests and concerns, and will conduct community relations activities as needed to address those concerns.

For more detailed information on community participation, see the McColl Community Relations Plan, dated May 1992.

6.0 SCOPE AND ROLE OF OPERABLE UNIT

As with many Superfund sites, the problems at the McColl site are complex. As a result, EPA has organized the work into two operable units (OUs). These are:

- OU One: Waste and contaminated soil
- OU Two: Contamination in the groundwater

The first OU, the subject of this ROD, addresses the waste and contamination of the surrounding soils.

EPA is currently in the Remedial Investigation/Feasibility Study (RI/FS) stage of OU Two. The ROD regarding OU Two is scheduled to be signed in October 1995.

7.0 SUMMARY OF SITE CHARACTERISTICS

As shown in Figure 2, there are 12 sumps containing waste at the site. The Ramparts area contains six sumps and the Los Coyotes area contains six sumps. Table 1 shows the estimated sump depths and volume of waste for each sump.

Figure 4 is a conceptual picture of a typical sump at the site, showing the soft material on the upper portion of the sump, followed by the char layer and finally contaminated soil.

Tables 2 and 3 show the average concentrations for waste-only samples and for waste and contaminated soil for selected organic and inorganic compounds of concern.

In general, the material contained within the sumps occurs as distinct types of waste that are somewhat segregated by depth, although not as discrete strata. The largest waste fraction consists of a hard organic waste material (char) that occurs mainly in the bottom layer of all sumps. The char has been described as a coal-like material in various drilling logs. The upper portion of the sumps is comprised of soil or a combination of soil and drilling mud. Tar wastes (tar) are also located in the sumps; however, the location and disposition of tar within the sumps is unknown. The area between the surface and the top of the continuous layer of char material has been designated by EPA as the "soft material layer" of the sumps.

Seeping of the tar waste has been observed in approximately 50 locations on seven of the sumps (see Figure 3). The tar waste is geotechnically unstable. It is acidic (pH consistently less than 2), contains a high concentration of leachable sulfate, and has a total organic carbon content of up to 61 percent. When exposed to the atmosphere, it emits gases including sulfur dioxide, benzene, and tetrahydrothiophene (an organic sulfur compound).

Drilling mud covers wastes in Lower Ramparts sumps R-1, R-2, and R4. The drilling mud is similar to a soft clay with a high moisture content. It is chemically characterized by a neutral to slightly alkaline pH (68), high leachable sulfate content, and a total organic carbon content of 34 percent.

The majority of char waste has been identified at the bottom layers of the sumps. Characteristics of this waste are a hard black, coal-like texture and a fine granular consistency when crushed. It is acidic (pH less than 2), contains elevated levels of organic and sulfur compounds, has a total organic carbon content of 40 percent and releases, like the tar waste, sulfur dioxide and volatile organic compounds such as benzene when exposed to the atmosphere.

Arsenic-containing waste has been identified in a limited area within the upper one to five feet of Ramparts sump R-1. This zone represents the interface between the drilling mud and the soil cover. Arsenic concentrations ranging from 40 to 5,000 mg/kg are found in the drilling mud and soil in this zone.

Contaminated on-site soils include the underlying soil material in contact with waste, the overburden, and the mixed soil and waste. The mixed wastes can appear as black liquid or coal-like materials, white powder, or dry black to brown powder within the soil matrix. Table 4 presents general physical and chemical descriptions of the characteristic wastes at McColl.

8.0 SUMMARY OF SITE RISKS

The baseline risk assessment provides the basis for taking action and indicates the exposure pathways that need to be addressed by the remedial action. It serves as the baseline indicating what risks could exist if no action were taken at the site. This section of the ROD reports the results of the baseline risk assessment conducted for the site.

The particular chemicals of concern identified in the risk assessment are listed in Table 5.

The Baseline Public Health Evaluation, dated May 1992, and the addendum dated July 1992, provides more detailed information.

The exposure pathways of concern evaluated for potential health risks are: 1) inhalation of volatile organic compounds (VOCs) emitted from the waste sumps, 2) inhalation of fugitive dust and inorganic compounds generated by wind erosion, 3) incidental ingestion of contaminated soil, 4) ingestion of contaminated garden vegetables, and 5) dermal contact with contaminated soil.

Below is a brief discussion of the health effects for primary chemicals of concern. For a complete discussion of health effects related to all chemicals of concern see the Baseline Public Health Evaluation, dated May 1992, and the addendum dated July 1992.

Benzene and sulfur dioxide are the primary chemicals of concern. The possible toxic effects of benzene in humans following exposure by inhalation include leukemia, central nervous system effects, hematological effects, and immune system depression. Chronic exposure to benzene vapors can produce reduced leukocyte, platelet, and red blood cell counts. Benzene is a known human carcinogen. In humans, acute exposure to high concentrations of benzene vapors has been associated with dizziness, nausea, vomiting, headache, drowsiness, narcosis, coma, and death. Sulfur dioxide is a colorless gas with a strong odor, which is emitted from the combustion of sulfur-containing fossil fuels, such as coal and oil, as well as many other sources. Sulfur dioxide is readily absorbed upon contact with the moist surfaces of the nose and upper respiratory passages. Once inhaled, sulfur dioxide is absorbed into the secretions lining the respiratory passages, then most of the sulfur dioxide is then transferred into the systemic circulation. The major toxic effects of sulfur dioxide

inhalation occur in the respiratory tract. Other information shows increased airway resistance or other bronchoconstrictive effects associated with sulfur dioxide. For more detailed information on the toxic effects of these and other contaminants associated with this site, see the Public Health Evaluation of Remedial Alternatives (PHERA), dated May 1992 and the addendum dated July 1992 and August 1992.

Arsenic, although not a primary chemical of concern, is a significant contaminant found at the McColl site. Arsenic is a known human carcinogen. The acute effects of arsenic are gastrointestinal effects, hemolysis, and neuropathy. Respiratory irritation may occur following contact with arsenic. The chronic effects can produce toxic effects on both the peripheral and central nervous systems, keratosis, hyperpigmentation, precancerous dermal lesions, and cardiovascular damage.

8.1 Toxicity Assessment Information

Evaluation of health risks from a chemical or mixture of chemicals is based on the concentration of the chemical to which an individual is exposed and on the duration and frequency of exposure. The chronic daily intake (CDI) is the estimate of daily exposure to a chemical resulting from all complete or potentially complete exposure pathways to a receptor averaged over an extended period of time. Calculation of the CDI considers the concentration of the chemical at the exposure point, the exposure frequency, the exposure duration, and the physical characteristics of the receptor. The total CDI for a potential receptor is the sum of the CDIs for each chemical of concern. For detailed calculations see the Baseline Public Health Evaluation, dated May 1992, and the addendum dated July 1992.

Table 6 shows a matrix of potential exposure routes quantitatively evaluated.

Table 7 shows a summary of complete exposure pathways evaluated for each receptor. (Child resident, adult resident, and Country Club worker.)

The following describes the CDI factor for each chemical within each relevant exposure pathway for a given population at risk and assumptions under which the CDI was calculated. The assumptions used to calculate these numbers are located in Appendix A.

8.1.1 Inhalation of VOCs

Tables 8 and 9 show a summary of carcinogenic and noncarcinogenic CDIs for the potential receptors for the inhalation of VOCs exposure pathway.

8.1.2 Inhalation of Fugitive Dusts

Tables 10 and 11 show a summary of carcinogenic and noncarcinogenic CDIs for the potential receptors for inhalation of fugitive dust exposure pathway.

The assumptions used to calculate these numbers are the same as those used for inhalation of VOCs.

8.1.3 Ingestion of Contaminated Homegrown Vegetables

Tables 12 and 13 show a summary carcinogenic and noncarcinogenic CDIs for the potential receptors of contaminated homegrown vegetation.

The assumptions used to calculate these numbers are located in Appendix A.

8.1.4 Ingestion of Contaminated Soil

Tables 14 and 15 show the summary of carcinogenic and noncarcinogenic CDIs for the potential receptors for ingestion of contaminated soil.

The assumptions used to calculate these numbers are essentially the same as those used to calculate the ingestion of contaminated homegrown vegetables.

8.1.5 Dermal Contact with Contaminated Soil

Tables 16 and 17 show the summary of carcinogenic and noncarcinogenic CDIs for the potential receptors for dermal contact with contaminated soil.

The residential and recreation receptors may also be exposed to chemicals via direct soil contact with the skin. As with other exposure pathways, exposure to soil contaminants via dermal contact is a function of exposure frequency and exposure duration. However, dermal absorption of chemicals is also a function of the amount of exposed body surface area. The exposure factors for the dermal pathways are the same as those described above for the inhalation pathways. Exposure to soil via dermal contact is also a function of several parameters unique to this pathway. They include the amount of skin exposed to soil, the amount of soil adhered to skin, and the proportional absorption of chemicals through the skin.

The assumptions used to calculate these numbers are located in Appendix A.

8.2 Risk Characterization

Potential carcinogenic risks at Superfund sites are generally evaluated by EPA in relation to an acceptable risk range of 10[-4] to 10[-6] established in the National Contingency Plan. Risks below this range are considered acceptable. Risks above this range are considered unacceptable and remediation is usually required. Within the risk range (10[-4] to 10[-6]) the Agency has the discretion to take action depending on site specific conditions.

A summary of total carcinogenic risks due to multipathway exposure is shown in Table 18. The risks range from 3x10[-8] to 5x10[-4].

Noncarcinogenic risks are described as a Hazard Index (HI), a unitless value. The HI is a measure of the potential for cumulative noncarcinogenic health effects and is the ratio of the exposure concentration or dose to the reference concentration (RfC) or reference dose (RfD). An HI greater than 1.0 indicates that there is a potential for a noncarcinogenic health effect to occur as a result of exposure to chemicals released from the site.

A summary of total noncarcinogenic risks due to multipathway exposure is shown in Table 19. The HI numbers range from less than 0.1 to 1.8.

There are certain aspects of the risk assessment that have likely resulted in an underestimation of potential risks for the McColl site. Airborne chemical concentrations resulting from sulfur dioxide and VOCs from the McColl site were estimated without consideration of the probable contribution of emissions from active seeps. The potential impact of seep emissions could not be evaluated quantitatively because of insufficient data on the chemical composition of the seeps and uncertainty related to the size and number of seeps that would occur at the site under baseline conditions. Therefore, potential risks and hazards associated with inhalation of sulfur dioxide and VOCs are likely to be underestimated.

The potential noncarcinogenic effects of inhalation of fugitive dusts could not be evaluated quantitatively because of the lack of toxicity criteria for inhalation exposure to the chemicals of potential concern in surface soil.

Exposure to surface contamination, including exposure to the waste, is likely to be underestimated for the following reasons: 1) exposure to seeps via dermal contact and/or incidental ingestion could not be evaluated quantitatively, and 2) the surface soil database is limited and may not represent the entire site.

Potential exposure to surface water runoff could not be evaluated quantitatively because surface runoff data representing current site conditions were not available.

Also, there are no EPA verified RfDs for sulfur dioxide and benzene. Therefore, EPA was not able to estimate non-carcinogenic risks for these compounds. However, if EPA verified RfCs are developed prior to implementation, their impact to human health will be evaluated during design.

EPA has made the following conclusions taking into account the uncertainties listed above:

- Of the chemicals initially identified as being of potential concern, three were identified as being associated with potential risks: arsenic, sulfur dioxide, and benzene.

- The average and RME total site carcinogenic risk estimates for all receptors, which range between 3x10[-8] and 5x10[-4], are below or within the acceptable risk range.

- The potential carcinogenic risks to residents living adjacent to the McColl site as a result of inhalation of organic vapors, ranging between 2 x 10[-6] and 2 x 10[-5], are within the acceptable risk range. The concentrations of VOCs at the fenceline locations were based on fate and transport modeling without consideration of the contribution of active seeps.

- For exposure to noncarcinogenic chemicals other than sulfur dioxide, the estimated total site noncarcinogenic HIs for the child resident and adult Country Club worker were less than 1.0.

- The estimated average total site noncarcinogenic HIs for exposure to chemicals other than sulfur dioxide for the adult resident was below 1.0, and the RME HI was above 1.0. The elevated HI for the RME case is associated with the dermal contact and incidental ingestion of on-site surface soil pathways.

- Potential risks associated with inhalation of sulfur dioxide could not be assessed quantitatively because of the lack of EPA-verified health criteria. The estimated concentrations of sulfur dioxide on-site and at nearby receptor locations resulting from the site were compared to concentrations known to produce adverse effects in humans.

- The estimated concentrations on site and at the fenceline receptor location were greater than those known to produce adverse effects in humans, indicating that toxic effects to the respiratory systems of people recreating on-site or living adjacent to the site could result from sulfur dioxide inhalation.

8.3 Environmental Risks

The Department of the Interior (DOI) prepared a preliminary natural resources survey in 1990, to determine whether any natural resources under the DOI trusteeship would be affected by hazardous substance releases at this site. The conclusions of this survey indicate that wildlife exposure to contaminants from the pits is minimal, and it would be hard to demonstrate if wildlife were contaminated or impacted by wastes prior to capping. It was also determined that a damage assessment to quantify injuries and damages to resources held in trust by the DOI is not needed.

8.4 Determination Regarding Risk

Based on the results of the BPHE and the conclusions summarized in this section, EPA has determined that actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

9.0 DESCRIPTION OF ALTERNATIVES

A detailed evaluation of the alternatives for treatment of waste and soils is presented in the SROA II, dated April 1992. Alternatives selected for discussion in the September 1992 Proposed Plan are listed below (see Table 20).

Risk evaluations (see the Public Health Evaluation of Remedial Alternatives, dated May 1992, and the addendum dated July 1992 and August 1992) were performed on all of the following alternatives, excluding No Action, Full insitu Solidification With A Clay Cap, and Selective in-situ Solidification With Waste Excavation.

9.1 Alternative #1: No Action

EPA is required to develop and evaluate the No Action Alternative. The No Action Alternative serves as the basis for the Baseline Public Health Evaluation (BPHE). This alternative assumes that no action would occur at the site, which would allow unrestricted access to hazardous wastes and contaminated soils.

9.2 Alternative #2: RCRA Equivalent Closure

Major Components of the Remedial Alternative

The major feature of this alternative is remediation of the site according to RCRA-equivalent closure requirements for a landfill or surface impoundments with waste left in place. This alternative would have provides for insitu waste containment with perimeter soil-bentonite cutoff walls, a multilayer low-permeability RCRA-Equivalent cap, and long-term groundwater and vadose zone monitoring.

Cover System Components

A multilayer cap would control air emissions escaping from the sumps and limit infiltration of surface waters and precipitation into the wastes. Gases emitted by the wastes would be collected and sent to a scrubber and granular activated carbon gas treatment system to control sulfur dioxide and organic compound emissions. Each of these systems would be designed, constructed, and operated to conform to current State of California and Federal RCRA requirements governing hazardous waste landfills. The proposed multi-layer cap design of this alternative would consist of a foundation layer, a gas collection layer, a compacted soil barrier layer, and a vegetation layer (see Figure 5). Slope stabilization, final grading, and recontouring of the site would be performed.

Time and Cost Components

The estimated time to implement this remedy is 2.2 years, with actual field work taking 1.3 years. The estimated capital (1990), operation and maintenance (yearly), and total present worth (1994) costs are $14,737,000, $828,000, and $36,722,000, respectively.

9.3 Alternative #3 RCRA-Equivalent Containment

Major Components of the Remedial Alternative

The major features of this alternative include constructing a secure, on-site hazardous waste landfill unit that meets the current State of California and Federal RCRA requirements. It also includes excavation of all waste materials and contaminated soil, excavating under engineering structures(enclosures) and placing the waste and contaminated soils in the newly constructed unit, and implementing RCRA requirements for site closure and post-closure maintenance.

The emissions from the enclosures would be collected and treated through an air treatment system. The air treatment system would be designed to treat for particulates, organic emissions (volatile and semi-volatile), and sulfur dioxide.

Containment Components

A multilayer cap system would control air emissions escaping from landfill and limit infiltration of surface waters and precipitation into the landfill. Gases emitted by the landfill would be collected and sent to a sulfur dioxide scrubber and granular activated carbon gas treatment system. Each of these systems would be designed, constructed, and operated to conform to current State of California and Federal RCRA requirements governing hazardous waste landfills. The final proposed multi-layer cap design of this alternative would consist of a foundation layer, a gas collection layer, a compacted soil barrier layer, and a vegetation layer (see Figure 5). Slope stabilization, final grading, and recontouring of the site would be performed.

Approximately 121,200 cubic yards of contaminated soil and hazardous waste would be excavated and re-deposited in a landfill with a final redisposal volume of 151,700 cubic yards due to re-handling. Slope stabilization, final grading, and recontouring of the site would be performed.

Time and Cost Components

The estimated time to implement this remedy is 5 years, with actual field work taking 4 years. The estimated capital (1990), operation and maintenance (yearly), and total present worth (1994) costs are $88,794,000, $828,000, and $135,740,000, respectively.

9.4 Alternative #4 Excavation and On-Site Rotary Kiln Incineration

Major Components of the Remedial Alternative

The major features of this alternative are excavation and on-site rotary kiln incineration. This alternative includes excavation of all waste materials and contaminated soil under engineered structures (enclosures) to control air emissions. The small volume of waste material having elevated levels of arsenic would be treated off-site and disposed of at a RCRA facility. The excavated non-arsenic contaminated materials would be transported to a waste storage enclosure and then to a waste-feed pretreatment enclosure and finally to a rotary kiln incinerator, all located on-site. Slope stabilization, final grading, and recontouring of the site would be performed.

The emissions from the enclosures and the rotary kiln incinerator would be collected and treated through air treatment systems. The air treatment system for the enclosures would be designed to treat for particulates, organic emissions (volatile and semi-volatile), and sulfur dioxide. The air treatment system for the rotary kiln incinerator would be designed to treat for particulates, organic emissions (volatile and semi-volatile), carbon oxides, nitrous oxides, and sulfur oxides.

Treatment Components

Approximately 121,200 cubic yards of contaminated soil and waste would be excavated and treated through rotary kiln incineration. The incineration process would destroy 99.99% of the principal organic hazardous constituents. The results of a rotary kiln incineration treatability study demonstrated that ash from the incinerator would be non-hazardous and would be used as backfill in excavated sumps. Refer to Demonstration of a Trial Excavation at the McColl Superfund Site, Applications Analysis Report dated October 1992 and the McColl Site Thermal Destruction Analysis Report dated October 1991 for further information.

Time and Cost Components:

The estimated time to implement this remedy is approximately 7.1 years, with actual field work taking 4.3 years. The estimated capital (1990), operation and maintenance (yearly), and total present worth (1994) costs are $167,863,000, $828,000, and $226,354,000, respectively.

9.5 Alternative #5 Full In-situ Solidification with a RCRA Equivalent Cap

Major Components of the Remedial Alternative

The major features of this alternative are full in-situ solidification of the cover material, drilling mud, tar, and char wastes in the Ramparts and Los Coyotes sumps. In addition to slope stability improvements, control and treatment of emissions would be handled by a shroud system routed to an air pollution control train. Also, grading of the solidified waste material and closure of the site with a RCRA-equivalent closure system followed by placement of top soil and re-vegetation would be performed.

Treatment Components

Approximately 121,200 cubic yards of hazardous waste & contaminated soil would be treated under this alternative.

The solidification process is envisioned as a multiple step procedure. The first step is the lime slurry neutralization process for the entire depth of the sump. The second step will consist of the a solidification pass down to 30 feet in depth. The third step will be another solidification pass for depths greater than 30 feet. Three of the deeper sumps (L-5, R-2, and R-6) would require the deep solidification pass. All hazardous material and contaminated soil would be treated using the in-situ solidification process. Only the metals, some of the semi-volatile organics, and the corrosive characteristics of the wastes would be treated by the solidification process. Volatile organic compounds and sulfur dioxide would be liberated from the waste and then captured and treated through an air treatment system using a lime based scrubber and an activated carbon unit.

Time and Cost Components

The estimated time to implement this remedy is 7.5 years, with actual field work taking 5.6 years. The estimated capital (1990), operation and maintenance (yearly), and total present worth (1994) costs are $68,446,000, $739,000, and $106,696,000, respectively.

9.6 Alternative #6 Full In-situ Solidification with a Clay Cap

Major Components of the Remedial Alternative

The major features of this alternative include full in-situ solidification of the cover material, drilling mud, tar, and char wastes in the Ramparts and Los Coyotes sumps. Control and treatment of air emissions would be performed using a shroud system routed to air pollution control trains, grading of the solidified waste material, and closure of the site with clay cap cover system followed by placement of top soil and re-vegetation.

Treatment Components

The components of this alternative are the same as Alternative #5 Full In-situ solidification with the exception of the cap. This alternative includes a clay cap rather than a RCRA-equivalent cap.

Time and Cost Components

The estimated time to complete this remedy is 7 years with actual field work taking approximately 5.1 years. The estimated capital (1990), operation and maintenance (yearly), and total present worth (1994) costs are $58,000,000, $739,000, and $97,000,000, respectively.

9.7 Alternative #7 Soft Material Solidification

Major Components of the Remedial Alternative

The major feature of this alternative is solidification treatment of waste and cover materials above the char/soft material interface in each of the sumps. In addition, slope stability improvements and installation of slurry cut-off walls would be included. Air emissions would be controlled and treated by the use of a shroud system routed to air pollution control trains. Also, grading of the solidified waste material and installation of a RCRA-equivalent cap followed by placement of top soil and re-vegetation would occur.

Treatment Components

Approximately 55,280 cubic yards of material would be solidified using this alternative (See Selected Remedy for specific details).

Time and Cost Components

The estimated time to complete this remedy is approximately 4.7 years with actual field work taking approximately 2.8 years. The estimated capital (1990), operation and maintenance (yearly), and total present worth (1994) costs are $46,073,000, $828,000, and $78,620,000, respectively.

9.8 Alternative #8 Selective In Situ Solidification with Waste Excavation

Major Components of the Remedial Alternative

This alternative was developed by the McColl Site Group and submitted to EPA on February 12, 1991. For a more detailed explanation of this alternative, see the Selective Excavation Treatment and RCRA Equivalent Closure Report prepared by Environmental Solutions, dated February 12, 1991.

In general, this plan includes pre-design cone penetrometer testing, treatment of selected materials that cause seeps, removal of arsenic hot spots, placement of crib retaining walls, slurry walls, surface water control, placement of a RCRA-equivalent cap, and a commitment to a site maintenance, monitoring, and security program.

Treatment Components

Approximately 33,000 cubic yards of material would be treated under this alternative. This process is envisioned as a two step procedure. The first step is a lime slurry neutralization process. It is expected that this step will be achieved at an average penetration rate of 0.4 feet/minute. The second step would consist of the solidification pass down to 30 feet in depth. Under this alternative none of the sumps would require a second solidification pass. The hazardous material would be processed using the in-situ solidification process. It is expected that only the metals and the semi-volatile organics would be treated during this process. Volatile organics and sulfur dioxide would be liberated from the waste and then captured and treated through an air treatment system using a lime based scrubber and activated carbon.

Time and Cost Components

The estimated time to complete this remedy is approximately 6 years with actual field work taking approximately 4 years. The estimated capital (1990), operation and maintenance (yearly), and total present worth (1994) costs are $37,000,000, $828,000, and $79,000,000, respectively.

9.9 Alternative #9 Selective In-Situ Solidification without Excavation

Major Components of the Remedial Alternative

This alternative is identical to Alternative #8 with the exception of the excavation portion. No excavation would be undertaken with this alternative.

Treatment Components

Same as Alternative #8

Time and Cost Components

The estimated time to complete this remedy is approximated 4.3 years with actual field work taking approximately 2.2 years. The estimated capital (1990), operation and maintenance (yearly), and total present worth (1994) costs are $37,729,000, $828,000, and $67,463,000, respectively.

10.0 NINE EVALUATION CRITERIA

EPA uses nine criteria to evaluate alternatives for cleaning up a National Priorities List site. The nine criteria are summarized below. In order for an alternative to be eligible for selection, it must meet the first two criteria described below, called threshold criteria. The next five criteria are known as balancing criteria. The final two criteria are modifying criteria (See 40 CFR 300.430(e)).

1. Overall Protection of Human Health and the Environment

Addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Addresses whether or not a remedy will meet certain federal and state environment laws and regulations, and provides grounds for waiving a particular ARAR.

3. Long-term Effectiveness and Permanence

Refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once the remedy has been implemented.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

Refers to the ability of a remedy to reduce the toxicity, mobility, or volume through treatment of the hazardous components present at the site.

5. Cost

Evaluates the estimated capital, operation and maintenance costs, and 30 year present worth of each alternative.

6. Short-Term Effectiveness

Addresses the period of time needed to complete the remedy, and any adverse impact on human health and the environment that may be posed during the construction and implementation period, until the remedy is fully implemented.

7. Implementability

Refers to the technical and administrative feasibility of a remedy, including the availability of materials and services needed to carry out a particular option.

8. State Acceptance

Indicates whether, based on its review of the information, the state concurs with, opposes, or has no comment on the preferred alternative.

9. Community Acceptance

Indicates whether community concerns are addressed by the remedy and whether or not the community has a preference for a remedy.

10.1 Comparative Analysis of Alternatives Against the Nine Criteria

For detailed information on the individual analysis of the alternatives against each of the nine criteria, refer to the Nine Criteria Analysis For the McColl Superfund Site, dated August 1992.

The comparative analysis portion of the nine criteria evaluation is a qualitative assessment of the relative strengths/weaknesses of the alternatives in relation to the nine criteria. This assessment appears in Table 21.

The assessment compares the level of confidence that EPA has in the ability of the identified remedy to achieve the objectives of a given criterion based on the information presented in the individual assessment portion of the nine criteria analysis. This is true for all of the criteria except cost, for which the 30 year present worth cost is presented. The cost figures have a +50/-30 percent confidence level.

The assessment assumes that, with the exception of no action, all of the alternatives will provide a minimum level of achievement under each criterion. The alternatives are compared in terms of level of confidence (high, medium, low) in the ability of each alternative to achieve the goals of the specific criterion under consideration.

EPA has assigned a high level of confidence to the first two criteria (Overall Protection of Human Health and the Environment and Compliance with ARARS) for all alternatives except No Action. EPA believes that each alternative except for the no action would achieve these threshold criteria.

Descriptions and examples in parentheses of levels of confidence for the five balancing criteria, with the exception of cost, are described in Appendix B.

For the modifying criteria, the levels of confidence for state acceptance and community acceptance reflects EPA's assessment of their support for the respective remedies based on comments received.

EPA believes this comparative assessment allows an objective comparison of the tradeoffs between the respective alternatives within a specific criterion and across all of the criteria. Based on both individual assessment and the comparative assessment, EPA weighed the alternatives and selected a preferred alternative for public review and comment.

11.0 THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives using the nine criteria, and public comments, EPA, after consultation with DTSC, has determined that Alternative #7 (Soft Material Solidification) is the most appropriate alternative for the McColl Superfund Site. Due to technical uncertainties that cannot be resolved until field implementation, EPA has determined that it is prudent to add a contingency to the selected remedy. Therefore, EPA believes that Soft Material Solidification with a contingency of RCRA-equivalent closure is the most appropriate remedy.

The selected remedy will involve solidification of all soft material in each sump above the char/soft material interface. EPA has selected Soft Material Solidification rather than closure alone because of the treatment component of solidification, which reduces the toxicity, mobility, and volume of hazardous waste while providing greater long-term effectiveness and permanence. Treatment of all soft material would best achieve the goals for solidification while providing the best balance of the nine criteria.

11.1 Goals of the Selected Remedy

The goals of solidification at the site are: (1) to solidify all of the soft material to minimize the potential threat of seeping material in the future; (2) to prevent the release of volatile inorganic (sulfur dioxide) and organic contaminants (benzene and tetrahydrothiophenes), to the maximum extent practicable, through chemical and physical reactions; and (3) to neutralize all of the soft material to eliminate the hazardous characteristics of corrosivity. In addition, as a result of the introduction of water and reagents to the existing soft material, it is also prudent to ensure that (4) the solidified material possesses internal strength characteristics (unconfined compressive strength) to support the RCRA-equivalent cap that is an integral part of the remedy.

11.2 Components of the Selected Remedy

This alternative consists of the following components:

- Excavation and decontamination of shallow metallic sprinkler pipes in the Los Coyotes area, followed by off-site transportation and disposal.

- Characterization of each sump using field methods (such as cone penetrometers, correlated with subsurface borings) to determine the top of the char layer in each sump.

- Installation of subsurface slurry cut-off walls around the Upper Ramparts sumps, and a separate slurry cut-off wall around the Lower Ramparts and the Los Coyotes sumps (see Figure 6).

- Slope stability improvements are to be determined during design in unstable slope areas (see Figure 7).

- In-situ solidification of the soil, drilling mud, tar wastes, and contaminated soils above the char layer. The proposed plan presented a conceptual approach of using two 5-foot diameter augers for the solidification. However, the final decision on the equipment size will be determined during design.

- The site will be graded (to contour the site, and to allow movement of waste away from homes) and a RCRA-equivalent cap, including a permanent gas collection and treatment system, will be placed over the solidified sumps.

- Long-term operation and maintenance including installation of groundwater and vadose zone monitoring wells, monitoring of the groundwater, and a gas collection system.

- Site security and routine site maintenance.

Prior to the initiation of in-situ treatment operations, a subsurface lime-slurry layer will be placed in each sump, and an emission suppressing foam will be applied over the entire ground surface of the waste sumps to help control emissions. The foam is expected to form a tough, flexible membrane over the sumps.

Emissions will also be controlled during solidification using a shroud system around the augers. The shroud will be maintained at a negative pressure so that emissions will flow into the gas treatment system.

The conceptual design of the gas treatment system consists of two stages of scrubbing with lime to reduce sulfur dioxide concentrations, followed by granular activated carbon units to absorb residual hydrocarbons. The primary scrubber will be a venturi scrubber and is expected to remove approximately 90 percent of the sulfur dioxide from the gas stream, condense out approximately 75 percent of the volatile hydrocarbons and 95 percent of the semivolatile hydrocarbons, and remove most of the particulate matter.

The secondary scrubber will be a packed-column scrubber that also utilizes lime as the scrubbing solution. It is estimated that the secondary scrubber will also have a 90 percent efficiency in removing sulfur dioxide from the primary scrubber effluent air stream. A granular activated carbon unit will be used to reduce total hydrocarbon emissions before the air stream is vented to the atmosphere.

11.3 Depth of Treatment for the Selected Remedy

Based on data gathered to date, the waste material is estimated to be distributed across the site in 12 sumps which range from 17 to 55 feet deep. Each of the sumps consists of several layers of soils and waste (soft material) and then char waste. The thickness of each of the different layers varies from sump to sump. Based on existing field data, EPA estimates that the continuous char layer starts approximately 6 - 17 feet below the ground surface (See Table 22). Based on the depths in Table 22, EPA estimates that 55,280 cubic yards of contaminated material will be treated.

In selecting Soft Material Solidification, EPA intends to treat by solidification all of the material in each sump above the char/soft material interface. The performance criteria that will guide the decision on whether Soft Material Solidification is technically implementable are based in part on the estimated depths of the char/soft material interface shown in Table 22.

However, these depths could be either overestimated or underestimated due to the limited nature of the existing data. The actual depth of the soft material layer in each sump will be determined during design.

If the depth of the char/soft material interface is determined to be at a shallower depth than estimated in Table 22, EPA is committed to treating only the soft material necessary to reach the char/soft material interface. This will result in treatment of less soft material than estimated in the SROA II.

If the depth of the char/soft material interface is determined to be at a greater depth than estimated in Table 22, EPA will determine how much, if any, of the soft material below the estimated depths will be solidified. EPA recognizes that a limit on depth for solidification may need to be established during design. The ultimate depth for solidification will be based on data collected during design, and will be guided by the performance criteria and the goals for Soft Material Solidification. This scenario could result in treatment of more soft material than estimated in the SROA II.

The scenarios discussed above are based on EPA's conceptualization of a typical sump presented in Figure 4. Given the uncertainty related to the relative flatness of the char/soft material interface, it is possible that under either scenario given above that some soft material may remain untreated and that some of the char material may also be treated. EPA expects that these slight variations in the type and/or volume of waste treated would not be considered significant changes to the remedy.

If the depth of the char/soft material interface is different than current estimates such that the volume of treated material is significantly altered (greater or smaller), EPA anticipates that modifications to this ROD might be necessary. EPA believes that modifications to the selected remedy resulting from changes in estimated volume of material treated due to a change in the definition of the char/soft material interface can be accomplished through an Explanation of Significant Differences (ESD). Notice of a change to the remedy through an ESD would not require an additional public comment period and would not delay remedy implementation. The remedy as modified could be implemented as soon as the changes are identified during design.

11.4 Slurry Walls, Retaining Walls, and RCRA-Equivalent Cap

The selected remedy includes slurry cut-off walls, retaining walls, and a RCRA-equivalent cap. The cut-off walls are intended to keep the wastes from migrating laterally. It is anticipated that two walls will be needed, one that will surround the Upper Ramparts area and one that will surround the Lower Ramparts and Los Coyotes area.

With the addition of material during solidification and placement of the cap, retaining walls may be needed on the slopes of the Upper Ramparts, Lower Ramparts, and Los Coyotes portions of the site. A detailed evaluation of all of the slopes will need to be done during the design phase and the actual size of those walls should be determined at that time.

The RCRA-equivalent cap will be necessary to ensure that water does not get into the waste and that gaseous emissions are not released to the atmosphere without treatment. This will be accomplished through the use of clay and gravel layers, synthetic liners, and water and gas collection systems. It is estimated that the cap could be up to nine feet thick. The actual height and materials to be used will be determined during the design phase of this project.

11.5 Residual Generation

Some residuals are expected as a result of implementing this remedy. These materials are scrubber effluent and spent activated carbon. They will be treated as hazardous waste and disposed of off-site at a facility permitted to accept such waste. In addition, approximately 14,000 cubic yards (40% of treated material) of additional material will be created due to swell during treatment. EPA anticipates that this material will be considered non-hazardous and will be graded across the site.

11.6 Cost and Time

The project implementation cost for this alternative is $46,073,000 (1990 dollars). The annual operation and maintenance costs are $828,000. The net present value (1994 dollars) for capital cost, and operation and maintenance cost for the 30 year design is $78,620,000. For a detailed breakdown of costs see Appendix C of the SROA II.

Implementation of this remedy is expected to take approximately 4.7 years, of which approximately 2.8 years is utilized for actual in-situ solidification activities. The remedial time frame is based on the use of two insitu drill rig units, support equipment, crews, and the requirement of a single sump pass for solidification. It is also assumed that the rigs would operate 300 days per year and treat wastes at a rate of 100 cubic yards per day per drill rig.

11.7 Risks and Hazards

The pathway of concern when evaluating the risks and hazards from implementation of Soft Material Solidification is inhalation of organic and inorganic substances. EPA anticipates potential exposure from fugitive emissions and emissions related to the air treatment systems of the cap and shroud. The primary compounds of concern are those listed in Table 5.

The carcinogenic risks associated with the implementation of this alternative range from $6x10^{-9}$ (worker) to $6x10^{-7}$ (child) under an average case exposure scenario. For the RME case, the range is from $1x10^{-8}$ (worker) to $1x10^{-6}$ (child). These risks fall within EPA's acceptable risk range.

The ranges of receptor HI (noncarcinogenic risks) for this alternative are 0.00002 (worker) to 0.005 (child) for the average case and the range is 0.00004 (worker) to 0.03 (child) for RME cases. EPA has determined an HI greater than 1.0 indicates that there is potential for a noncarcinogenic health effect to occur as a result of exposure to chemicals released from the site. The estimated HIs are acceptable to EPA. Overall, it has been determined that this alternative is protective of human health and the environment.

11.8 One Sump Test: Performance Criteria for the Selected Remedy

Soft Material Solidification will be applied first to one sump to determine if it is technically implementable. In deciding whether Soft Material Solidification is technically implementable, EPA will consider at a minimum the following eight performance criteria:

1. Ability to control generation of future seeps:

    - Ability to perform sufficient mixing of waste and reagents to prevent seepage of tar material from treated material

2. Ability to control emissions during treatment process:

    - Ability to meet air ARARs

3. Ability to render waste material non-hazardous:

    - Ability to eliminate through solidification the corrosivity characteristics of the waste material

4. Ability to support RCRA-equivalent cap:

    - Unconfined compressive strength sufficient to support RCRAequivalent cap both short and long term

5. Ability to move or grade the treated material:

    - Shear strength sufficient to allow for grading of material

    - Emission potential of treated material low enough to allow grading

6. Ability to control nuisance to surrounding community:

- Ability to control noise impacts to within acceptable levels for surrounding community

- Ability to control odor impacts to within acceptable levels for surrounding community

- Ability to control visual impacts to within acceptable levels for surrounding community

7. Estimated field time:

- Ability to control field time to four to six years

8. Estimated cost of completion:

- Ability to control costs to a thirty (30) year present worth range of $79,000,000 to $120,000,000.[*]

  <Footnote>* $120,000,000 is EPA's initial cost estimate of $79,000,000 with fifty (50) percent escalation, which is consistent with +50/-30 percent cost estimating performed during RI/FS phase of project.</footnote>

11.8.1 Evaluation of Performance Criteria

At the conclusion of the one sump test, EPA will consider whether the results of the one sump test, when extrapolated to site-wide implementation, deviate excessively, both individually and collectively, from the expected results set forth in these eight criteria. EPA recognizes that the interpretation of the test results will require qualitative judgement by EPA, in consultation with the State, regarding the implementability of Soft Material Solidification site-wide. These criteria are guidelines that EPA will use as parameters for decision-making. Deviation from these criteria does not automatically trigger implementation of the contingent remedy. EPA will evaluate the extent of deviation from these criteria and determine if Soft Material Solidification continues to be the most appropriate remedy for the site.

If EPA determines that Soft Material Solidification is technically implementable, it will be implemented on the remaining eleven sumps. The amount of material to be solidified in these remaining eleven sumps is addressed in Section 11.3 above.

EPA currently envisions at least two scenarios that would result in a decision not to implement Soft Material Solidification site-wide following the one sump test. The information necessary for the evaluation of these two scenarios will be gathered during the implementation of Soft Material Solidification on sump L-4 and from other design work. The first scenario would arise if for purely engineering reasons Soft Material Solidification is unable to meet the first six criteria. Under this scenario, EPA will immediately proceed with the implementation of the contingent remedy of RCRA-equivalent closure.

The second scenario would be that Soft Material Solidification is viable from an engineering perspective but, in EPA's judgment, the cost and/or time frame for implementing the remedy site-wide excessively exceeds the guidelines of criteria 7 and 8. Under this scenario, EPA will immediately proceed with the implementation of the contingent remedy of RCRA-equivalent closure.

11.9 Contingency Remedy

Although EPA is confident that Soft Material Solidification will be successful at the McColl site, there is inherent uncertainty whenever a remedy involves the implementation of a proven treatment technology in an innovative manner. Therefore, EPA has decided to include RCRA-equivalent closure (Alternative #2) as a contingent remedy in the event EPA determines that Soft Material Solidification is not technically implementable as discussed above.

If RCRA-equivalent closure is chosen it would consist of the following: constructing a multilayer cap over the untreated sumps with a gas collection and treatment system to prevent infiltration of water and release of hazardous air emissions; building subsurface slurry walls around the sumps to prevent migration of water into the waste and outward migration of contaminants; stabilizing steep slopes on the site with retaining walls; and conducting groundwater monitoring. Operation and maintenance will be necessary in perpetuity at the site, which include site security and routine site maintenance.

During the Design phase, EPA will update the existing Community Contingency Plan. This document deals with monitoring of emissions and implementing responses to emissions when necessary in order to protect the health and safety of the community during field activities.

11.9.1 Cost and Time

The project implementation cost for the contingency remedy is $14,737,000 (1990 dollars). The annual operation and maintenance costs are estimated at $828,000. The net present value (1994 dollars) for capital cost and operation and maintenance cost for 30 year design is $36,722,000.

Implementation of this remedy is expected to take approximately 2.2 years, of which approximately 1.3 years is utilized for actual field activities.

11.10 End Use of the McColl Site

After implementation of the selected remedy, the McColl Site will have characteristics of a closed landfill for purposes of end use. While the property owners of the McColl site will have discretion to propose end uses, EPA must ensure that the end use is consistent with the implemented remedy. While EPA is not approving a particular end use in this ROD, potential end uses could include a nature park, recreational park, or golf course.

As part of this remedy, EPA is also imposing institutional controls on the site property to prevent uses inconsistent with the implemented remedy. Because waste materials will remain under the cap, these controls will prevent construction of structures or addition of materials that could compromise the integrity of the implemented remedy.

EPA will require improvements to the Site necessary for the successful implementation of the remedy. Off-site improvements cannot be incorporated into this ROD. However, EPA intends to work closely with interested groups including the City of Fullerton, the landowners, the PRPs and the community to explore the need for and implementation of improvements to the property surrounding the site.

A maintenance program will be implemented and will involve regular inspections for: differential settlement; soil cover integrity; the need for additional grading or vegetation; sediment and erosion; and gas collection/treatment system operation. The design of any end use would have to be compatible with the design and operation and maintenance of the cap. In addition, long-term groundwater and vadose zone monitoring will take place.

12.0 STATUTORY DETERMINATIONS

Under CERCLA section 121, EPA must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy and the contingency remedy meet these statutory requirements.

12.1 Protection of Human Health and the Environment

EPA has determined that the selected remedy, Soft Material Solidification, is protective of human health and the environment by conducting a risk assessment which evaluated both the implementation and long term risk associated with the alternative. This risk assessment evaluated both carcinogenic and non-carcinogenic risks associated with the project over a lifetime. The maximum carcinogenic risk and non-carcinogenic hazard estimated for the project are 1 x 10[-6] and 0.03 respectively. EPA considers risks within or below 10-4 to 10-6 to be acceptable. EPA also considers non-carcinogenic hazards with an hazard index (HI) value of 1.0 or less to be acceptable. EPA also believes that the unquantified risk and hazard due to the waste seepage at the site will be effectively reduced as a result of the implementation of the selected remedy. Therefore, EPA believes that the selected remedy is protective of human health and the environment. The risk assessment also indicate that the contingency remedy, RCRA-equivalent closure, is protective of human health and the environment using the above definitions of acceptable risk and hazard.

12.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

The selected and contingent remedy will comply with all ARARs. The ARARs are presented in Appendix C.

12.3 Cost Effectiveness

This remedy will achieve short and long term effectiveness and permanence, and reduction of toxicity, mobility and volume of hazardous waste through treatment, at an estimated cost of $79,000,000. Therefore, the selected remedy provides an overall effectiveness proportionate to its costs, when compared to the cost effectiveness of the other alternatives considered. If Soft Material Solidification is not technically implementable, the contingent remedy of RCRA-equivalent closure would provide overall effectiveness proportionate to its costs, when compared to the cost effectiveness of the remaining alternatives.

12.4 Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. Soft Material Solidification provides the best balance of trade-offs among the nine criteria in combining treatment technologies with containment technologies.

If the selected remedy is not technically implementable based on the performance criteria provided in this ROD, the contingency remedy (RCRA equivalent closure) will provide the utilization of permanent solutions and alternative treatment technologies to the maximum extent practicable.

12.5 Preference for Treatment as a Principal Element

EPA believes that the selected remedy effectively treats the principal threats at the site. There are three significant pathways (inhalation, direct contact, ingestion) identified in the Baseline Public Health Evaluation.

The principal threats for the inhalation pathway are benzene and sulfur dioxide. The benzene and sulfur dioxide will be effectively treated through two mechanisms. During the implementation of the solidification portion of the selected remedy, the benzene and sulfur dioxide found in the soft material layer will be liberated and captured in the shroud of the drilling rig. They will then be processed through an air treatment system. After installation of the RCRA equivalent cap, any remaining benzene and sulfur dioxide will be captured by the cap itself and processed through an air treatment system.

The principal threat for the ingestion and direct contact pathways is arsenic. The arsenic found in the soft material layer will be effectively treated during the solidification process.

EPA believes that the preference for treatment as a principal element has been addressed through the selection of Soft Material Solidification. Soft Material Solidification will treat those hazardous volatile organic compounds emitted during the solidification process through the air treatment system associated with the solidification process. Hazardous semi-volatile organic compounds will be treated either through the solidification process or through the air treatment system associated with the solidification process. Soft Material Solidification will also treat the acidic waste material in the soft material layer and is expected to render it non-hazardous.

If Soft Material Solidification is not technically implementable, the contingent remedy, while primarily a containment remedy, will provide for limited treatment of hazardous volatile, semi-volatile, and inorganic compounds through the air treatment system of the RCRA-equivalent cap.

13.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the McColl Superfund site was released for Public comment in August 1992. Soft Material Solidification with a contingency of RCRA-equivalent closure was identified as the preferred remedy in the Proposed Plan. EPA has reviewed all written and verbal comments submitted during the public comment period. After reviewing the comments received, it was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary.

APPENDIX A

Assumptions Used to Calculate Inhalation of VOC's

APPENDIX A

Assumptions used to calculate inhalation of VOCs are as follows:

Adult Residents

The inhalation rate of adult residential receptors was calculated to be 0.83 m^3 (cubic meters)/hour or 20 m^3/day.

Child Residents

An average inhalation rate of 0.66 m^3/hour or 16 m^3/day was estimated for child residents by using the following activity pattern and inhalation rates.

- 48% of the time at rest and 0.4 m^3/hour
- 48% of the time at light activity and 1.0 m^3/ hour
- 3% of the time at moderate activity and 3.2 m^3/hour
- 1% of the time at heavy activity and 4.2 m^3/hour

Country Club Worker

The inhalation rate of 20 m^3/day per 8 hour work day.

Young Adult Recreation Receptor

For the average case scenario, an inhalation rate of 4.2 m^3/hour was assumed, based on a standard factor for a child (aged 10 years) involved in heavy activity. For the RME case, a inhalation rate of 3.2 m^3/hour was used based on an assumed moderate level of physical activity for twice the length of exposure. The lower rate was chosen because it is expected that an individual could not maintain the heavy physical activity implied by the 4.2 m^3/hour inhalation rate for the length of exposure assumed for the RME case.

Exposure Time

Exposure time refers to the number of hours per day an individual is exposed to chemical in air. The following assumptions were used:

- Children (1-6 years) exposure time was 16 hours/day for the average case and 24 hours/day for the RME case.

- Young adults were assumed to be 16 hours/day for the average case and 22 hours/day for the RME case. The average and RME case exposure times for on-site inhalation exposure for these receptors was assumed to be 1 and 2 hours/day.

- Country Club worker was assumed to be 8 hours/day.

Exposure Frequency

Exposure Frequency refers to the number of days in which exposure occurs per week, month or year. The following assumptions were used:

- Child and adult residents, and adult recreation receptors exposure frequency was 350 days/year.

- On-site young adult recreation receptors frequency exposure was assumed to be 6 days/week or 312 days/year.

- Country Club worker exposure frequency was assumed to be 250 days/year.

Exposure Duration

Exposure duration is the period of time the exposure will persist. Resident receptors evaluated have been divided into three age groups. The following assumptions were used:

Children (1-6 years old) - Average and maximum exposure durations were both 6 years.

Young adult receptor - Average and RME exposure durations were 4 and 12 years respectively.

Adult Residents - Average and RME durations were 5 and 18 years respectively.

Young adult recreation receptors - Average and RME exposure durations were 4 and 12 years respectively.

Adult recreation receptors - Average and RME durations were 5 and 18 years respectively.

Country Club Worker - Average and RME durations were 12.5 and 25 years respectively.

Body Weight

The standard assumptions are as follows:

Adult Residents - 70 kilograms (kg)

Recreation receptors - 70 kg

Country Club workers - 70 kg

Resident children (between 1 and 6 years of age) - 16 kg

Young adults (age 7-18) - 43 kg

Averaging Time

Based on the hypothesis that cancer risk is proportional to an average exposure to a carcinogen during a lifetime, the averaging time for carcinogens is considered to be a 70-year lifetime. The averaging time for noncarcinogens is based on the exposure duration rather than a lifetime because the adverse health effects on noncarcinogens are believed to have thresholds and are not believed to accumulate over a lifetime. The noncarcinogen averaging time for each exposure pathway is equivalent to the exposure duration in years multiplied by 365 days/year.

The assumptions used to calculate ingestion of contaminated homegrown vegetables are as follows:

The intake of chemicals through ingestion pathways is a function of the quantity of soil and vegetables consumed, the frequency and duration of exposure, and the body weight of the receptor. Aside from the ingestion rates, ingestion fractions, and exposure frequencies, the exposure factors for the ingestion pathways (e.g. exposure durations and body weights) are the same as those described above for the inhalation pathways.

Exposure Frequency

The exposure frequency for incidental ingestion of soil by on-site recreation and off-site residential and worker receptors are the same as that used for the inhalation exposure scenarios. The exposure frequency for ingestion of homegrown vegetables is assumed to be one-half of the residential exposure frequency of 350 days/year, or 175 days/year. A lower frequency of exposure is assumed for this pathway because it is unlikely that an individual will eat homegrown vegetables year-round.

Soil Ingestion Rate

The soil ingestion rate used for adult and children residential receptors are 100 mg (milligrams)/day and 200 mg/day respectively. The rate used for workers is 50 mg/day.

Vegetable Ingestion Rate

The total vegetable ingestion rate for all both adult and child residents was assumed to be 200 g (grams)/day for both average and RME exposures. Workers at off-site receptor location R23 were assumed not to consume vegetables grown in the study area. It was assumed that 50-percent of the total intake was from leafy vegetables (e.g. lettuce) and 50 percent from vine vegetables (e.g. tomatoes).

Fraction Ingested

It is assumed that 100% of the total daily ingestion rate for soil/dust for all receptors is derived from exposures associated with the McColl site. The fraction of vegetables ingested from the site is a function of the percent of total daily vegetable ingestion that is derived from household gardens. Twenty-five percent of vegetables are assumed to be homegrown under the average case and 40-percent was assumed for the RME cases.

The assumptions used to calculate dermal contact with contaminated soil are as follows:

Skin Surface Area Exposed

The average and RME surface areas for children are 1,000 and 2,000 cm[2] (square centimeters)/event, respectively. The surface areas for young adult and adult residents, recreation receptors, and workers are 2,000 and 5,000 cm2/event for average and RME cases respectively. For the average cases, an individual is assumed to wear a long sleeve shirt, pants and shoes. Therefore, the exposed skin surface is limited to the head and hands. For RME cases, it was assumed that an individual wears a short sleeve shirt, shorts and shoes. Therefore, their exposed skin surface is limited to the head, hands, forearms, and lower legs. These scenarios suggest that approximately 10 to 25 percent of the skin may be exposed to soil.

Soil-to-skin Adherence Factor

The soil-to-skin adherence factor of 0.5 mg/cm2 used is based on dermal exposure guidance issued by EPA (1991).

Absorption Factor

Dermal absorption factors for chemicals of potential concern were assumed to be as follows:

APPENDIX B

Levels Of Confidence for Five Balancing Criteria

Appendix B

Below are descriptions and examples of levels of confidence for the five balancing criteria: Long Term Effectiveness, Reduction of Toxicity, Mobility or Volume through Treatment and Short Term Effectiveness.

Long Term Effectiveness and Permanence

A high level of confidence is assigned to an alternative in which the magnitude of residual risk is minimized through engineering controls or institutional controls that are permanent and that do not need long-term controls to assure minimization of residual risk. This is envisioned for alternatives where a proven technology (incineration) renders the treated material nonhazardous and long-term engineering and/or institutional controls are not necessary to assure minimization of residual risk.

A medium level of confidence is assigned to an alternative in which the magnitude of residual risk is minimized through engineering controls and/or institutional controls that are potentially permanent but not proven on the waste matrix present. A medium level of confidence is also assigned to an alternative in which long-term controls to assure minimization of residual risk are necessary with the confidence in the adequacy and reliability of the controls high. This is envisioned for alternatives where an innovative technology (solidification of acid waste) is employed and a cap with gas collection is provided to assure minimization of residual risk.

A low level of confidence is assigned to an alternative is which the magnitude of residual risk is minimized through engineering controls and/or institutional controls, but the certainty of permanence and the effectiveness of treatment on the waste matrix present is unknown. A low level of confidence is also assigned to an alternative in which long-term controls to assure minimization of residual risk are necessary controls is low. This is envisioned for alternatives where an unproven technology (in-situ steam stripping of acid waste) is employed and a cap with unproven treatment (biodegradation to control emissions) is provided to assure minimization of residual risk.

Reduction of Toxicity, Mobility or Volume through Treatment

A high level of confidence is assigned to an alternative in which a proven treatment technology is employed to reduce the toxicity, mobility or volume of a hazardous waste. This is envisioned for an alternative that employs a proven technology (solidification of acid sludge) on a portion of the hazardous waste at the site.

A medium level of confidence is assigned to an alternative in which an innovative technology is employed to reduce the toxicity, mobility, or volume of a hazardous waste or a portion of the hazardous waste at the site. This is envisioned for alternatives that use an innovative technology (solidification of acid sludge) on a portion of the hazardous waste at the site.

A low level of confidence is assigned to an alternative in which no treatment is employed to reduce the toxicity, mobility or volume of a hazardous waste. This is envisioned for alternatives that employ non-treatment engineering controls (Caps, slurry walls) only.

Short Term Effectiveness

A high level of confidence is assigned to an alternative if protection of the community, workers and environment during implementation are assured and easy to achieve over a short period of time. This is envisioned for alternatives, where minimal disturbance of hazardous material is expected or where, if hazardous materials are encountered, the potential for adverse impacts are minimal due to the elimination of exposure pathways through easily implemented engineering and/or institutional controls. It is also envisioned that these control are necessary over a short period of time.

A medium level of confidence is assigned to an alternative if protection of the community, workers and the environment during implementation are assured, but low level of uncertainty exists related to the performance of the engineering or institutional controls employed to achieve the desired level of protection. This is visualized for alternatives where there is reliance on innovative technologies (using a shroud to control volatile organic compounds and sulfur dioxide emissions during solidification) for minimizing exposure when hazardous materials are encountered. Another scenario is for alternatives where special operating conditions (limiting) the rate of solidification to control emissions) are employed in the field to minimize exposure duration. This in turn leads to longer time periods until long term protection is achieved.

A low level of confidence is assigned to an alternative if protection of the community, workers and the environment during implementation are assured, but a high level of uncertainty exists related to performance of the engineering or institutional controls employed to achieve the desired level of protection. This is visualized for alternatives where there is reliance on innovative technologies to provide high levels of reduction (greater than 90%) to control exposure to hazardous material.

Implementability

A high level of confidence is assigned to an alternative where the technical and administrative implementability is assured and the level of uncertainty in the technical aspects of implementation is low. This is envisioned for alternatives where disturbance of hazardous material is minimized (capping) and the technology has been implemented successfully before at similar sites (capping).

A medium level of confidence is assigned to an alternative where the technical and administrative implementability is assured but the level of uncertainty in the technical aspects of implementability is moderate. This is envisioned for alternatives where definition of the material of concern is easily assured (full in-situ solidification), but ease of application of the treatment technology is uncertain (material to be treated).

A low level of confidence is assigned to an alternative where the technical and administrative implementability is assured but the level of uncertainty in the technical aspects of implementability is high. This is envisioned for alternatives where excavation under an enclosure is a prime component of the alternatives (incineration). This is also envisioned for alternatives where definition of the material of concern is not easily assured (selective in-situ solidification with excavation).

APPENDIX C

Tables of Applicable, Relevant, and Appropriate Requirements